Winter 2014-15: Propane Supply & Infrastructure

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By
T. Mason Hamilton, Petroleum Markets Analyst
U.S. Energy Information Administration
Winter 2014-15 takeaways and potential issues—propane

- Primary propane stocks in the Gulf Coast and Midwest are currently 10 million barrels (17%) above this time last year.

- Propane production from natural gas plants is up and is projected to average 970,000 bbl/d this winter, 110,000 bbl/d higher than last winter.

- The outlook for propane demand is uncertain
  - Another record corn crop is expected
  - U.S. winter heating degree days have recently ranged from a low of 3,225 in 2011-12 to 4,114 in 2013-14

- Propane supply is adjusting to recent infrastructure changes
  - Cochin Pipeline Reversal
  - New and expanded rail facilities in the Midwest
  - Pre-season secondary and tertiary inventories will be critical to meeting demand from cold weather and/or a wet corn harvest
The Midwest has highest concentration of homes heated with propane

Share of homes by primary space heating fuel and Census Region

Source: EIA calculations based on U.S. Census Bureau, 2013 American Community Survey
Increasing production and exports change U.S. propane supply-demand balance

Propane demand is seasonal - stocks build in the summer and are drawn in the winter to meet heating needs
U.S. propane production and trade trends

U.S. propane and propylene production, imports, and exports
million barrels per day

Source: EIA, Petroleum Supply Monthly through July 2014; August and September 2014 are estimates
Changes in propane infrastructure and flows

2008-10: Y-grade pipeline expansions move Rockies production to fractionators at Conway

2011-12: Increased NGL production from Rockies increases inventories and lowers prices at Conway

2012-13: Pipelines that once moved NGL to Conway, reverse towards higher priced Gulf Coast

2012-14: Petrochemical demand and Fractionation expansions on Gulf Coast absorb increased production

*(Y-Grade) = Unprocessed mix of natural gas liquids (propane, butane, ethane etc.)

Source: U.S. Energy Information Administration
History of Conway (KS) and Mt. Belvieu (TX) prices – 2009-13

Propane spot prices
dollars per gallon

Conway, KS
(PADD 2)

Mt. Belvieu, TX
(PADD 3)

Prolonged Conway price discount to Mt. Belvieu

Conway price higher than Mt. Belvieu

Conway price lower than Mt. Belvieu

Price Spread
(Conway - Mt. Belvieu)

Infrastructure changes narrow discount

Source: U.S. Energy Information Administration, Thomson Reuters, data through March, 2013
PADD 2 changes to net supplier of other regions as a result of infrastructure changes

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock draw</td>
<td>0.7</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Stock build</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.1</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Net receipts from other regions</td>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Net imports</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Gas plants</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Total production</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Refineries</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Net shipments to other regions</td>
<td>-0.1</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.5</td>
</tr>
<tr>
<td>Net exports</td>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
</tbody>
</table>


PADD 2 switched to sending more propane to other regions than receiving in 2012
Last year, the corn harvest immediately followed by winter weather increased propane demand. The graph shows that the propane demand increased compared to previous years, followed by winter weather demand. The chart is sourced from the U.S. Energy Information Administration, Petroleum Marketing Monthly.
Propane infrastructure and flows: Winter 2013-14

Source: U.S. Energy Information Administration
Conway price premium over Mt. Belvieu grew rapidly in late January.

Source: U.S. Energy Information Administration, Thomson Reuters, data through October 3, 2014
PADD 2 (Midwest) propane inventories are within the five-year range and above the five-year average.

PADD 2 propane* inventories

million barrels

Source: EIA, Weekly Petroleum Status Report, data through October 03
*propane/propylene for fuel use only

Typical corn harvest dates (Sept 20 – Nov 10)

28.0 (10/03/14)

27.5 previous 5-year average, as of 10/03/14
PADD 3 (Gulf coast) propane inventories are well above the five-year range

PADD 3 propane* inventories

Source: EIA, Weekly Petroleum Status Report, data through October 03

*propane/propylene for fuel use only
Price premium in Conway (KS) has encouraged inventory building in PADD2

**Weekly average propane price spreads: Conway - Mt. Belvieu (April-October)**

*Conway price premium*

- Conway price higher than Mt. Belvieu
- Conway price lower than Mt. Belvieu

**Source:** U.S. Energy Information Administration, Thomson Reuters, data through October 3, 2014
Propane inventories for key individual states

**Kansas propane refinery and bulk terminal inventories**

- Thousand barrels
- Inventory values shown from January to December
- 5-year range (2009-2013)
- Rolling 5-year average
- Data point: 14,859 (9/5/14)

**MN, WI, IA & IL combined propane refinery and bulk terminal inventories**

- Thousand barrels
- Inventory values shown from April to December
- 5-year range (2009-2013)
- Rolling 5-year average
- Data point: 1,795 (9/5/14)

**Michigan propane refinery and bulk terminal inventories**

- Thousand barrels
- Inventory values shown from January to December
- 5-year range (2009-2013)
- Rolling 5-year average
- Data point: 4,162 (9/5/14)

**Ohio propane refinery and bulk terminal inventories**

- Thousand barrels
- Inventory values shown from January to December
- 5-year range (2009-2013)
- Rolling 5-year average
- Data point: 460 (9/5/14)
Evolving Propane Supply Situation

- Canadian rail shipments to rail terminals in Midwest
- Enbridge pipeline carries NGL Mix from Canada
- Depropanizers remove propane from a mix of NGLs to then distribute into local market

Propane produced in Bakken must either be shipped by rail or be sent to Conway to be fractionated

Y-grade pipelines moves Rockies and Bakken production to fractionators at Conway or Mont BelVieu

Benson terminal converted to rail unloading

Increased propane shipments on existing pipelines

Propane shipped via pipeline, rail and truck from Conway

Legend:
- Market hub
- Pipeline flow
- Y-grade pipeline flow
- Depropanizer
- Rail loading (fractionator or processor)
- Rail unloading (new or expanding)
- Former Cochin terminal

Source: U.S. Energy Information Administration
Evolving Midwest Propane Supply Situation

- **Markets**
  - **Prices**
    - Summer price premium at Conway incented storage builds in Midwest and indicated off season buying
  - **Secondary and tertiary storage**
    - Distributors promoting early fills for customers

- **Supply situation**
  - **Bakken**
    - Currently no pipeline to move purity propane from gas processors in North Dakota to the rest of Midwest
  - **Canada**
    - Rail loading facilities under construction to move propane out of Alberta to Midwest in response to Cochin
  - **Rockies**
    - Production must first be fractionated at Conway or Mont Belvieu, prices determine destination

- **Cochin pipeline alternatives**
  - **Pipelines**
    - Limited remaining capacity on existing pipelines
    - Regulation currently prevents prioritization of propane shipments over other products
  - **Rail**
    - New and expanded propane by rail unloading terminals
    - Limited pressurized railcar availability
    - Fallible in cold weather and prone to delays
    - Limited rail loading capacity
  - **Truck**
    - Costly when done over long distances
    - Limited by hours of service and weight limitations

*(Y-Grade) = Unprocessed mix of natural gas liquids (propane, butane, ethane etc.)*
The Northeast relies on propane imports for peak winter demand

Source: U.S. Energy Information Administration, Petroleum Supply Monthly
Weather will determine demand impact from corn harvest - 2014

Source: U.S. Department of Agriculture, National Agricultural Statistic Service, *Crop Progress Report*
Winter 2014-15 takeaways and potential issues – heating oil

• Brent crude oil spot price forecast to average $9/barrel (22 cents/gal) lower this winter.

• Distillate stocks in the Northeast totaled 29.3 million barrels on September 26, 0.2 million barrels below the same time last year and the lowest level for this time of year since 2000. However, demand should be met via supplies from the Atlantic Basin market.

• Five states (CT, MA, NJ, RI, VT) lowered their heating oil maximum sulfur specification in July from 2,000+ ppm to 500 ppm.

• New regulations (MARPOL Annex VI) limit marine vessel fuel sulfur levels in certain coastal waters to 1,000 ppm in January 2015.
Winter 2013-14: U.S. East coast imported distillate to meet demand

Heating oil sulfur specifications lowered in five states as of July 2014

### Schedule for maximum sulfur content of heating oil in the Northeast by year

**parts per million (ppm)**

| State       | 2010-1,000 ppm | 1,000-10,000 ppm | 10,000 ppm+
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<tbody>
<tr>
<td>New York</td>
<td>2,000-15,000 ppm</td>
<td>15 ppm</td>
<td></td>
</tr>
<tr>
<td>New Jersey</td>
<td>2,000-3,000 ppm</td>
<td>500 ppm</td>
<td>15 ppm</td>
</tr>
<tr>
<td>Connecticut</td>
<td>3,000 ppm</td>
<td>500 ppm</td>
<td>15 ppm</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>3,000 ppm</td>
<td>500 ppm</td>
<td>15 ppm</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>5,000 ppm</td>
<td>500 ppm</td>
<td>15 ppm</td>
</tr>
<tr>
<td>Vermont</td>
<td>20,000 ppm</td>
<td>500 ppm</td>
<td>15 ppm</td>
</tr>
<tr>
<td>Delaware</td>
<td>3,000-10,000 ppm</td>
<td>15 ppm</td>
<td></td>
</tr>
<tr>
<td>Maine</td>
<td>3,000-5,000 ppm</td>
<td>500 ppm</td>
<td>15 ppm</td>
</tr>
<tr>
<td>Pennsylvania*</td>
<td>2,000-5,000 ppm</td>
<td>500 ppm</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Specifications change on July 1 of the years shown, with the exception of Maine's 15 ppm requirement, which changes on January 1, 2018.*

*Philadelphia, Pennsylvania changes from 2,000 ppm to 15 ppm on July 1, 2015.*

*Source: U.S. Energy Information Administration*
Northeast distillate inventories are changing sulfur content

Sulfur content of distillate stocks (NJ, MA, CT, RI, VT)
Percent of total distillate stocks

Crude delivered by rail continues to supply West Coast refineries

While EIA currently does not collect data on domestic movements of crude oil and products by rail, an examination of EIA data reveals that there is a growing supply of crude to the West Coast (PADD 5) that is not explicitly accounted for by production, imports, or movements from other PADDs via pipeline, tanker or barge (Figure 1). Based on data and information published by the California Energy Commission and on information published by U.S. West Coast refiners on crude volumes moving by rail, a significant portion of this growing unaccounted-for crude is delivered via railroad to West Coast refineries. Through July of this year (the latest data available) PADD 5 unaccounted-for supply has averaged 191,000 barrels per day (bbld), representing nearly 8% of regional supply.

Figure 1. PADD 5 unaccounted-for crude supply, 3-month average thousand barrels per day

Retail prices (dollars per gallon)

<table>
<thead>
<tr>
<th></th>
<th>Change from last</th>
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</thead>
<tbody>
<tr>
<td>U.S. regular gasoline prices</td>
<td></td>
</tr>
<tr>
<td>09/29/14</td>
<td>3.354</td>
</tr>
<tr>
<td></td>
<td>3.354</td>
</tr>
<tr>
<td>Diesel</td>
<td>3.755</td>
</tr>
</tbody>
</table>

Futures prices (dollars per gallon*)

Crude oil future price contract 1

U.S. Energy Mapping System - there is a map for that

www.eia.gov/state/maps
For more information


Short-Term Energy Outlook | www.eia.gov/steo

Annual Energy Outlook | www.eia.gov/aeo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

State Energy Portal | www.eia.gov/state

Drilling Productivity Report | www.eia.gov/petroleum/drilling
National Propane Gas Association (NPGA): state affiliates indicate strong secondary and tertiary storage fill

- **ILLINOIS** – retailers indicate the majority of end-users have filled tanks, record corn crop could mean large demand for drying.

- **IOWA** – retailers’ storage full including significant storage additions, many customers opted for summer fill, corn harvest expected to start second week in October.

- **MICHIGAN** – retailers report a range of 66-90% of customers opting for pre-buy and price-lock programs.

- **MINNESOTA** – deliveries up by 25 mil. gal. over any previous year, expect summer fill at + 30 mil. gal. over same time last year.

- **MISSOURI** – strong interest in contracts and “pre-buy”; many residential customers opted for summer fill; Concerns over bottlenecks if stocks draw down; Jefferson City terminal recently ran out of propane as it was opting to ship butane.

- **NORTH DAKOTA** – 85% of commercial and residential customers filled early, already seeing grain-drying; ~4 million gallons of new commercial storage; Concerns over reliability of rail for delivery.

- **Large Companies** – campaigns for residential and crop dryers to fill over the summer reportedly successful. Less success with COD customers.